



Minnesota Plant Press

The Minnesota Native Plant Society Newsletter

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Minnesota Native Plant Society

A non-profit organization dedicated to the conservation and appreciation of Minnesota's native plants and plant communities through education and public awareness.

Ball Cactus (*Escobaria vivipara*) in Minnesota

By David Remucal, MNNPS Board Member, and Curator of Endangered Plants, Minnesota Landscape Arboretum

The little ball cactus, while more common further to the west, just peaks into the state on the western edge for a grand total of one known population. This population is pretty spread out, covering several properties but the largest concentrations of the cacti appear to be on granite quarry lands. There are also subpopulations on Big Stone National Wildlife Refuge (NWR) and some private and municipal lands, all in the same area. Of immediate interest is that the two granite quarries are seeking permits to take (i.e. destroy) their subpopulations as the cactus lives on granite outcrops. The University of Minnesota Landscape Arboretum Plant Conservation Program



The Minnesota Endangered ball cactus in flower

(UMLA), in partnership with US Fish and Wildlife Service, The Nature Conservancy (TNC) and the University of Minnesota (UMN) College of Biological Sciences Conservatory, is hoping to salvage those cacti and move them someplace safe before they get destroyed.

When you look around for this cactus in Minnesota, you'll find that it almost always lives on exposed granite outcrops on thin soils or duff layers that are often (but not always!) anchored in cracks in the rock surface. You can also find it in the vegetation and deeper soil areas around the exposed rock, but this is pretty rare so it is likely that it is outcompeted in that deeper soil and it is usually found on the rocks because it is one of the few plant species that can live that exposed.

Since this little cactus is typically found on the exposed granite outcrops in its habitat, it is right in the crosshairs, so to speak, of the quarry operations wanting to get at the granite features. UMLA and partners have received a two-year Legislative-Citizen Commission on Minnesota Resources (LCCMR) grant to move the genetics of these populations to safe, protected areas. The original plan was to move adult plants, but doing-

Monthly Meetings

Monthly meetings will be virtual for May and June with a return to in person programming October 2022. We are also looking to mix in person and virtual meetings, hosting virtual meetings during the winter months. This will allow the Society to invite speakers from across the country. Another perk is that this will allow us to engage with our membership throughout the state and beyond.

Upcoming schedule:

May 5, 2022 (7PM) - On Lichens: Lessons in Symbiosis, Joe Walewski

June 2, 2022 (7PM) - Jumping Worms in Minnesota, Lee Frelich

Society Leadership

Board members' names are followed with the year their term expires in parentheses.

President: Scott Milburn (2024)

Vice President: Welby Smith (2025)

Secretary: Jennifer Kamm (2023)

Treasurer/Membership: Ken Arndt

Board Member: John Arthur (2023)

Board Member: Simba Blood (2025)

Board Member: Steve Eggers (2024)

Board Member: Rhett Johnson (2024)

Board Member: David Remucal (2023)

Board Member: Annie Weeks (June, 2022)

Conservation Chair: David Remucal

Program Chair: Annie Weeks and Scott Milburn

Social Coordinator: Shirley Mah Kooyman

Field Trip Coordinator: Ken Arndt and Jennifer Kamm

Webmaster: Katy Chayka

Website: www.mnnps.org

Technical/Membership: contact@mnnps.org

continued -so would be dependent upon the quarries obtaining the proper take permits with the Minnesota Department of Natural Resources (DNR) as translocations are not currently an allowed form of direct mitigation for endangered and threatened species in the state. Because we typically like to do redundant conservation, we were prepared in case these permits didn't come through, which they have not so far. We have also surveyed and collected seed at all known sites that we could gain permission to collect (which included one, but not both, quarry sites) in 2020 and 2021. As a result of this survey work, our local intrepid volunteer, Terri Dinesen (manager of the Lac qui Parle State Park) has found two new subpopulations and we have managed to bank thousands of seeds from this population.

This seed collection, besides creating a genetic bank, has allowed us to start several hundred seedlings both at the UMLA and at the UMN College of Biological Sciences Conservatory which we will be able to plant out (fingers crossed) in the fall of 2022 in case the permits to take the adults don't come through, or in addition to moving them if they do. We would be establishing some of these plants in the nearby Big Stone NWR, likely on outcrops where there are no cacti currently, and the rest at Plover Prairie, a TNC property in the vicinity that has outcrops but no cacti. Ideally we would plant around 700 or so cacti, which may not sound like an overly large amount, but would significantly increase the Big Stone NWR subpopulation size and would require a large amount of effort as the cacti live in such thin soils that it will be a challenge to get the cacti to establish their first year. The seedlings are currently underway at the UMLA and will soon be at the UMN College of Biological Sciences Conservatory, as well. Germinating these seeds also acts as a germination test for seed prior to being put into long-term storage. This testing is standard operating procedure for seedbanks, giving a baseline viability number to test against from subsamples tested in the future so we can monitor the continued persistence of the seeds in the bank over time.

One of the major issues with establishing plants (either from transplants or grown in pots) in natural landscapes is water. Unless you are planting into saturated soil, the plants will need to be watered and these cacti definitely do not live in saturated soils! The solution to this is to move or plant the plants during their dormant period whenever possible and let the plants take advantage of the change in moisture that comes with the release-

continued -from dormancy, which in Minnesota generally means both snow melt and rainfall, in addition to the change in temperatures. When the plants wake back up, they should have moisture available to use. The problem with doing planting during this time period, especially with small plants and thin soils, is how to get the plants to stay put during that first winter before they have grown roots into the soil. We are testing a few different anchoring methods this winter, so hopefully will have a workable solution come springtime.

Of course, once planted, there is no guarantee that these cacti will establish. Rare plant transplants or introductions fail more often than they succeed, but with each researched project more information is gathered, including which species are likely to succeed and which are not. This knowledge allows permittees and rescue programs alike the ability to better focus resources on the species that need to be protected on the land they occupy and just move the ones that can handle it.



An image of the related Missouri foxtail cactus (*Escobaria missouriensis*). The key diagnostic differences are flower color and color of the spines. The two are easily distinguished when it flowers. However, an observer is likely to be reliant on vegetative diagnostics. Spines on this species are a bright white, while *Escobaria vivipara* are reddish-brown.

A Biodiversity Checkup for Minnesota's Big Woods

By Lee E. Frelich, Director, The University of Minnesota Center for Forest Ecology

This project was funded by the Legislative-Citizens Commission on Minnesota Resources (LCCMR) and started during July 2021. I am the project manager and Minnesota Native Plant Society (MNNPS) was listed as a collaborating organization!

Big Woods are mesic, sugar maple, American basswood and red oak-dominated forests of southeastern Minnesota, from the St. Cloud area southeastwards to Rochester. More than 90% of Big Woods present at the time of European settlement has been converted to agricultural fields and other human land uses. Given the well-established concept that large areas can support more species than small areas, the questions arise: (1) Can we maintain all plant species on a small percentage of the original area? (2) Is the natural areas reserve system (including Scientific and Natural Areas and other natural areas such as county and state parks functioning as it was planned? (3) Are there certain groups of species that are doing better under the changed conditions, and others not doing well?

The purpose of this biodiversity checkup is to compare the historic and current number of plant species in the Big Woods, in total for the entire ecosystem, and per unit area for individual Big Woods remnants. We will examine plant species because they comprise a large proportion of all species, are the ecosystem base that supports soil health, pollinators, and all wildlife species. Historical records of plant occurrences in the Big Woods will be assembled from several sources. University herbarium records of plant collections done over the last ca 150 years are now digitized and available via electronic searches. Also available are publications in peer-reviewed journals, university student theses, Minnesota Biological Survey (MBS) data, and many other species lists that were created over the last several decades when a given park or natural area was established.

Current species lists will be assembled in the field by a graduate student assisted by a pool of skilled citizen scientists, and this is where MNNPS members may be able to help. We will assess the extent to which premier Big Woods remnants (old growth in designated natural areas), remnants that had been logged, cleared, farmed and returned to forest (second growth) and partly-

continued -degraded remnants (e.g. invaded by buckthorn, forests in city parks) each function to preserve native plant diversity.

Preliminary data collected during summer 2021 showed two important results. First, we were able to compare sites with and without jumping worms (the latest earthworm invasion; Asian species in the genus *Amyntas*) at the UMLA. At the 7.5-acre spatial scale there were 76 plant species in the non-jumping worm infested areas (however all Big Woods forests in Minnesota are infested with European earthworms), but only 50 species in an equivalent area of jumping worm-infested forest, a 34% reduction in number of species. We will expand this analysis as we find new sites that are infested with jumping worms.

Second, we compared two old-growth remnants (Wood-Rill Scientific and Natural Area and Taylor's Woods in Three Rivers Park District, Elm Creek Park) with two second growth forests (Crow Hassan and UMLA), and showed that species richness was significantly higher in second growth forest—an estimated 201 species for second growth versus 161 for old-growth stands. This difference was primarily due to the presence of early and mid-successional species that persist in second growth stands (80-to-100 years old); it was good to see that second growth forests are recovering from logging and have many of the species present in old-growth remnants.

We need to study more sites to verify whether this pattern holds for the region as a whole, do comparisons with historic flora data to see if fewer species are present now than in the past in the old growth sites, and whether certain specialist species, or species in certain taxonomic groups (e.g. native orchids) are missing in the contemporary Big Woods forest remnants. Therefore, we would like to collaborate with MNNPS members who may have flora lists for other Big Woods sites, know of historic data (e.g. old floras for specific sites) that could be used in the project, or perhaps be willing to collect flora data from other Big Woods sites during the 2022 or 2023 growing seasons. Please contact Lee Frelich (frel001@umn.edu) if you are interested.

Sprague Creek Peatland Scientific and Natural Area

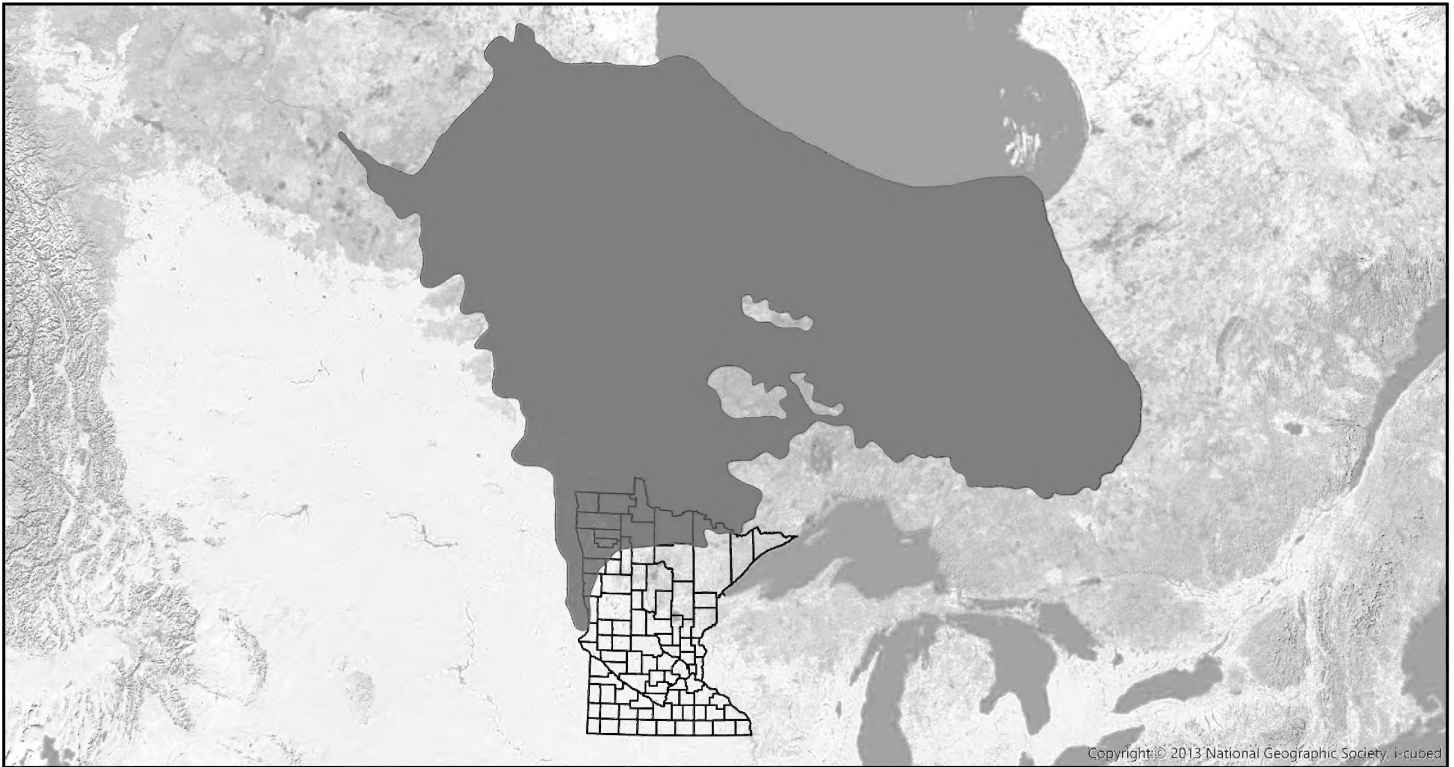
By Scott A. Milburn, MNNPS President

Situated on the international border with Canada immediately outside of Roseau is an extensive peatland system. An 825-acre portion of this peatland has been designated as the Sprague Creek Peatland Scientific and Natural Area (SNA), first designated as such in 1991. Due to the remoteness and difficult terrain, this SNA is likely visited by very few. A complex mix of varying peatland communities, the Sprague Creek Peatland is one of the crowning jewels of the SNA program.

Before continuing on about Sprague Creek Peatland, it is first important to discuss peatlands in general. Minnesota has more than 6 million acres of peatland, which is second only to Alaska. There are two topographic peatland types in our state. One type is peatlands formed and confined to depressions in the landscape, forming mat fringes on lakes or entirely replacing lakes over time. The second type are those peatlands developing on flat or gently sloping ground in the absence of a lake. It is also important to note the role of hydrology which is a critical driver in peatland development, determining mineral enrichment and ultimately influencing vegetative composition.

The peatlands located within the confines of the historic lake plain of Glacial Lake Agassiz represent that second topographic type. Graphic 1 shows the extent of Glacial Lake Agassiz which retreated over a series of episodes leaving behind a flattened landscape in portions of its footprint. Peat accumulation was absent initially following the retreat and this was due to climatic conditions, allowing for greater rates of evaporation over rates of precipitation. Wetlands were indeed present at this time within the lake plain, but were primarily wet meadow and wet forest systems. Neither type of wetlands are considered peat forming systems. The climatic conditions then changed between 5,000 and 6,000 years ago, thus favorable for the development of peat.

There are three peatland types that are present within the lake plain of Glacial Lake Agassiz: raised bogs, water tracks, and spring fen channels. These peatland types can be found in association with one another in what is termed a patterned peatland, which is easily discernible from an aerial view. The first peatland type, is the raised bog on the right side of **Image 1** and bordered by a fen community.



Graphic 1. Extent of Glacial Lake Agassiz

The second peatland type is the water track peatlands which have three subtypes. The first subtype are patterned fens or alternatively called aapamoors, consisting of strings which are peat ridges, and flarks which are sometimes referred to as pools. The second subtype are the tree islands, and the third subtype are the featureless water tracks.

Image 2 illustrates both tree islands in association with patterned fens.



Image 1. A raised bog, bordered by a fen community. Raised bogs have a raised profile in cross-section and have a forested crest of black spruce (*Picea mariana*).

The third peatland type is the string fen channel. This highly uncommon community is only known in eight locations of Minnesota, and are strictly associated with the lake plain of Glacial Lake Agassiz.



Image 2. Tree islands with strings and flarks. The hydrologic flow here is flowing parallel with the tree islands and perpendicular with the water track features.

The third peatland type is the string fen channel. This highly uncommon community is only known in eight locations of Minnesota, and are strictly associated with the lake plain of Glacial Lake Agassiz. Image 3 is an iconic example of a string fen system. They are calcareous in nature but different than the conceptual calcareous fen. These systems are embedded within forested peatland communities, which should be referred to as forested fens. A number of rare calciphile plant species are known to occur in these string fen channels including coastal sedge (*Carex exilis*) and (beaked spikerush) *Eleocharis rostellata*. However, vegetative composition does vary between the documented string fens, but this is more of an issue of movement of these species across the landscape.



Image 3. String fen channel in Lost River Scientific Natural Area

Back to Sprague Creek Peatland, the SNA includes three primary communities: Rich Black Spruce Swamp Forested Peatland, Shrub Rich Fen, and Northern Extremely Rich Fen.

Forested segments primary fall under the classification of the Rich Black Spruce Swamp community (**Image 4**). These communities are influenced by mineral rich groundwater discharge, allowing for a diverse assortment of plant species. As the colloquial community's name suggests, black spruce is a prominent species which accounts for most of the forested canopy cover. Also present in the canopy are tamarack (*Larix laricina*) and white cedar (*Thuja occidentalis*), with varying cover. Interesting shrub species interspersed throughout include bush juniper (*Juniperus communis*), the rare McCalla's willow (*Salix maccalliana*), and lingonberry (*Vaccinium vitis-idaea*) with the more ubiquitous species that include Labrador tea (*Rhododendron groenlandicum*) and dwarf alder (*Rhamnus alnifolia*). Sedge diversity is great with hair-like sedge (*Carex capillaris*), feminine sedge (*Carex gynocrates*), sparse-flowered sedge (*Carex tenuiflora*), sheathed sedge (*Carex vaginata*), green-keeled cottongrass (*Eriophorum viridicarinatum*), and Hudson Bay bulrush (*Trichophorum alpinum*). Orchids are also quite common throughout with small round-leaved orchid (*Amerorchis rotundifolia*), tuberous grass pink (*Calopogon tuberosus*), stemless lady's slipper (*Cypripedium acaule*), the rare ram's head orchid (*Cypripedium arietinum*), showy lady's slipper (*Cypripedium reginae*), heart-leaved twayblade (*Listera cordata*), green adder's mouth (*Malaxis unifolia*), tall northern bog orchid (*Platanthera huronensis*), small northern bog orchid (*Platanthera obtusata*), and large round-leaved orchid (*Platanthera orbiculata*). Other interesting and uncommon to rare species include marsh horsetail (*Equisetum palustre*) and the state-listed northern oak fern (*Gymnocarpium robertianum*).

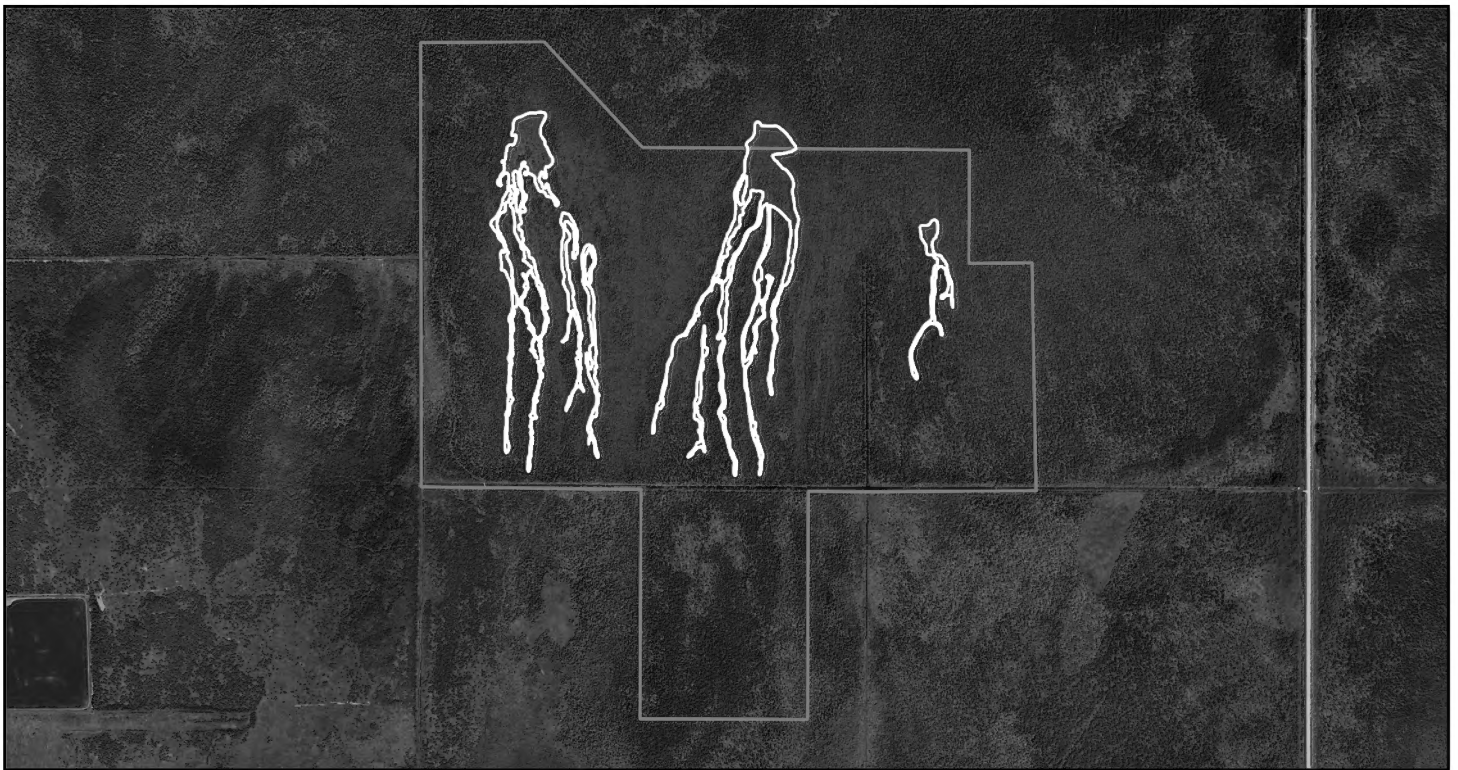


Image 4. Rich Black Spruce Swamp community

The Shrub Rich Fen community in concept typically has shrub cover that ranges from sparse to interrupted with low shrub species of primarily bog rosemary (*Andromeda polifolia*), bog birch (*Betula pumila*) and shrubby cinquefoil (*Dasiphora fruticosa*). The areas that classify as this community deviate from the expected cover. This could be due to changes in hydrology from major landscape alterations or simply that this is the way this particular community has always been. The difference here is that the shrub layer is actually dominated by stunted conifer species (tamarack, black spruce, and white cedar) as well as the typical smaller shrub species of the three aforementioned shrub species. The guess as to why the cover is the way it is can be explained as simply being that communities that we experience today are elastic and ever changing. Those natural changes occurring over long stretches of time are not noticeable over an average human lifespan. Obviously, that is not the case when it-

continued -comes to our impact to the landscape.

Those areas defined as the Northern Extremely Rich Fen community run north to south and are interspersed within the forested peatland components (**Graphic 2**). The width of these channels varies in size, but is generally easy to traverse. As with other spring channel fens elsewhere, the systems at Sprague Creek are graminoid dominated but species rich. Interesting graminoid species include candle-lantern sedge (*Carex limosa*), twig rush (*Cladium mariscoides*), Hudson Bay bulrush (*Trichophorum alpinum*) and tufted bulrush (*Trichophorum cespitosum*). As with the forested peatland components, the channels are orchid rich and include dragon's mouth (*Arethusa bulbosa*) and tall white bog orchid (*Platanthera dilatata*) along with a rich variety of other forbs. Charismatic forbs include English sundew (*Drosera anglica*), lesser fringed gentian (*Gentianopsis procera*), Kalm's lobelia (*Lobelia kalmii*), American grass-of-parnassus (*Parnassia glauca*), pitcher plant (*Sarracenia purpurea*), seaside arrowgrass (*Triglochin maritima*), and marsh arrowgrass (*Triglochin palustris*). **Images 5 and 6** are examples of one of the string fen channels at Sprague Creek.



Graphic 2. Contemporary string fen channel in Lost River Scientific Natural Area

There are also a number of unusual plants occurring at Sprague Creek Peatland SNA. This includes the modest aster (*Canadanthus modestus* (Lindley) G.L. Nesom). This species may be unfamiliar to most in both name and prevalence. This species had been a member of the Aster genus, which has been resorted over the past 30 years and now the lone species in the genus *Canadanthus*. The modest aster is found in the northwest United States and is not considered rare in these states. It has also been documented in the Lake Superior region, with documentation restricted to Douglas County, Wisconsin and Keweenaw County, Michigan, as well as the Minnesota collection.

According to the Bell Atlas, there have only been 25 collections made, with the last submission back in 2010. A review of the voucher species includes a who's who in Minnesota botanical history with the likes of Frederick Butters, Lynden Gerdes, Olga Lakela, Carl Rosendahl, Perry Scott, Welby Smith, and Gary Walton. Most collections were made by Lakela.

As is standard with older collections, habitat descriptions are either absent or quite basic. However, contemporary vouchers along with personal observations indicates that this species is most likely to be found in open wet meadow systems, and able to persist with varying levels of natural and anthropogenic disturbance. The rhizomatous growth form, like with many composite species, serves to be quite advantageous as it pertains to success with competition. Previously only documented in the Arrowhead counties of Cook, Lake, and St. Louis, the presence-

continued -of this species at Sprague Creek is a new record for Roseau County.

Similar in appearance to other composites, the modest aster is likely overlooked when not in flower. I have to imagine that I must have encountered this species unknowingly during my time in the field well before this introduction. However, it is now ingrained in my mind now and I look forward to my next experience with the modest aster. Perhaps it is most easily confused with *Symphytotrichum novae-angliae*, the New England aster, but distinguished by three traits: disk color, clasping nature of the leaves, and glandular abundance. The disk flowers of the modest aster are light yellow in appearance, counter to the golden disk flowers of the New England aster.



Image 5. String fen channel at Sprague Creek Peatland SNA in June



Image 6. String fen channel at Sprague Creek Peatland SNA in August

The cauline leaves of both species are sessile, but considerably clasping on the New England aster, and only marginally clasping on the modest aster. Both species happen to have glandular hairs associated with the inflorescence, but the abundance of glandular hairs is quite striking with the modest aster.

This species is only tracked by the Minnesota Department of Natural Resources, but the lack of documented populations would suggest that a status change to Special Concern is warranted in the near future.

Some of the more notable plants at Sprague Creek Peatland SNA are shown in **Images 7-10**.



Image 7. Twig rush - *Cladium mariscoides*



Image 7. Ram's head orchid - *Cypripedium arietinum*

Another rare species present at Sprague Creek Peatland SNA is *Helianthus nuttallii* subsp. *rydbergii*, Nuttall's sunflower. This is one of three subspecies found in the United States, with distribution primarily of this subspecies restricted to the Great Plains. There are very few documented occurrences in Minnesota of Nuttall's sunflower, with a handful of possible records since the early 1960's. The reason for such a limited collection is tied to the difficulty with the genus in general. *Helianthus* as a genus is plagued by introgression and hybrid swarms, leading to many improper identifications. The true distribution of Nuttall's sunflower in Minnesota is uncertain but likely both rare and overlooked. The oddity of the population here is due to the habitat where found.



Image 9. Tall white bog orchid - *Platanthera dilatata* var. *dilatata*



Image 10. Lingonberry- *Vaccinium vitis-idaea*